ENGINE-DRIVEN WORK MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an engine-driven work machine, which is driven by an engine while performing work, and more particularly relates to an engine-driven work machine such as an electric power generator, a welding machine, and the like, that is attached to a pipe frame in a transportable constitution.

2. Description of the Related Art

This type of engine-driven work machine is often attached to a pipe frame, such as that disclosed in Japanese Patent Laid-Open No. 1997-217632, in order to make it easier to handle when moving and transporting it around the work place.

Large machines are fitted with sling fittings, which interlock with members for slinging such as hooks and ropes, so that the machines can be lifted by crane. Japanese Utility Model Laid-open No. 1984-015680 and Japanese Utility Model Laid-open No. 1989-062971 illustrate a large engine-driven work machine that has this type of sling fitting.

Small engine-driven work machines are attached to pipe frames, and do not have the sling fittings of the larger machines.

However, when using a small machine outdoors, even though it is desirable that it should be possible to move and transport the small machine by crane and the like, the structure is not suitable for slinging.

SUMMARY OF THE INVENTION

This invention has been realized in view of the above points, and aims to provide an engine-driven work machine that is attached to a pipe frame and has a structure suitable for slinging.

In order to achieve these objects, this invention provides the invention described in aspects one to four.

In the first aspect, this invention provides an engine-driven work machine comprising a transportable structure that is attached to a pipe frame, a sling fitting being provided above the pipe frame and rotatably connected thereto.

In the second aspect, the engine-driven work machine of the first

aspect comprises a stopper which stops the rotation of the sling fitting in a near-vertical direction.

In the third aspect, the engine-driven work machine of the first aspect comprises a shock-absorber on the side of the sling fitting.

In the fourth aspect, in the engine-driven work machine of the first aspect, the sling fitting has a bent section, which extends at a right-angle to the bottom edge of a center section, and bent sections, which are approximately C-shaped in plan view and are provided near both ends of the sling fitting.

This invention obtains the following effects.

According to the invention of the first aspect, the engine-driven work machine can be handled normally by using a pipe frame, and in addition, by raising the sling fitting, which is usually in a collapsed position, the engine-driven work machine can be lifted by a crane or the like.

According to the invention of the second aspect, the rotation of the sling fitting is stopped in a near-vertical direction, so that the stopper connects with the sling fitting at a predetermined position, enabling the engine-driven work machine to be lifted in a stable state.

According to the invention of the third aspect, the shock-absorber prevents collision with the surface of the work machine main body even when the sling fitting is collapsed.

According to the invention of the fourth aspect, the sling fitting has a bent section for increasing its rigidity, whereby the weight of the sling fitting can be reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A to 1C are diagrams illustrating a constitution of a first embodiment of this invention, Fig. 1A showing a front view, Fig. 1B, a right side view, and Fig. 1C, a plan view;

Figs. 2A to 2D show the shape of a sling fitting in the first embodiment shown in Figs. 1A to 1C, Fig. 2A showing a front view, Fig. 2B, a left side view, Fig. 2C, a plan view, and Fig. 2D, a cross-sectional view taken along the line A – A of Fig. 2A;

Fig. 3 is a perspective view of one example of a hinge supporting structure for the sling fitting in the first embodiment shown in Figs. 1A to 1C;

Figs. 4A to 4C show the shape of a sling fitting in a second

embodiment of this invention, Fig. 4A showing a front view, Fig. 4B, a left side view, and Fig. 4C, a plan view; and

Fig. 5 is an exploded perspective view of a supporting structure for a sling fitting in a third embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the invention will be explained with reference to the accompanying diagrams.

Figs. 1A, 1B, and 1C respectively show a front view, a right side view, and a plan view of a first embodiment of this invention. As shown in Figs. 1A, 1B, and 1C, an engine-driven work machine 10 comprises a control panel 12, an engine 13, an electric power generator 14, a battery 15, and the like, which are attached to a pipe frame 11, comprising a pipe and connecting members. According to this constitution, when moving or transporting the engine-driven work machine 10, an operator can handle it by taking hold of the frame.

A collapsible sling fitting 20 is provided on the top of the pipe frame 11 at a position corresponding to the center of gravity of the work machine. The sling fitting 20 has a hole for slinging 21a and an elastic shock-absorber 21b that are formed in the center section of an approximately mountain-shaped plate, bent sections for hinges 22 that are formed at each end of the plate, and a bending edge section 23 for strengthening, which extends along the center bottom edge of the plate at a right-angle to the center section 21.

To make the structure lighter, in addition to the hole for slinging 21a, holes are provided in the sling fitting 20 by partially removing the material. Furthermore, to increase the local rigidity of the sling fitting 20, bent sections that are approximately C-shaped in plan view are formed near each end of the sling fitting 20 to increase its bending strength.

The sling fitting 20 is bend-processed so that the center of the hole for slinging 21a and the rotational centers of hinge sections 22a lie approximately in the same perpendicular face. Consequently, when the engine-driven work machine 10 is lifted by a crane or the like, a force acts evenly on the hinge sections 22a, making it possible to lift the center of gravity of the work machine in a balanced state.

The sling fitting 20, which can be rotated around the hinge, is usually collapsed in the position shown by the broken line in Fig. 1A; it is pulled

upright when lifting the engine-driven work machine, and a hook or the like is clipped into hole for slinging 21a.

Therefore, usually, (e.g. when the engine-driven work machine is being stored) the collapsed sling fitting 20 protrudes no further than the height of the pipe frame 11. Thus only the engine-driven work machine 10 need be packed away, and it can be packed away above or below other machines.

Figs. 2A, 2B, and 2C show the sling fitting 20 of Fig. 1 in detailed enlargement. Fig. 2A is a front view, Fig. 2B is a left side view, Fig. 2C is a plan view, and Fig. 2D is a cross-sectional view taken along the line A – A of Fig. 2A.

As shown in Fig. 2A, the circular hole for slinging 21a is formed in a center section 21, and holes 21c for attaching the shock-absorber 21b (see Figs. 1A to 1C) are formed on each side of the hole for slinging 21a. One pear-shaped hole 21d is provided near each end of the center section 21 in order to reduce the overall weight of the sling fitting 20.

Fig. 3 shows an example of a hinge section structure for the sling fitting in the first embodiment. A bolt 22c is inserted through the hinge hole 22b in the hinge section 22a of the sling fitting 20, which is rotatably supported by the pipe frame 11 using a metal washer 22d, a lubricous Duracon (Registered Trademark) washer 22e, a metal washer 22f, and a looseness-preventing nut 22g. A stopper 11b is secured to the pipe frame 11, and meshes with the hinge section 22a in its standing state.

The lubricous washer 22e and the looseness-preventing nut 22g are used in order to firmly secure the sling fitting 20 with the bolt 22c, and hold it firmly in place. The stopper 11b supports the sling fitting 20, and also stops it from colliding with the lid of a fuel tank that is provided below the sling fitting 20.

Embodiment 2

Figs. 4A, 4B, and 4C show the shape of the sling fitting in a second embodiment of this invention, different from that shown in Figs. 1 and 2, in enlarged front view, left side view, and top view. The C-shaped bent sections near each end, and the bending edge section 23 along the center bottom edge, are not provided in this case, and consequently the overall shape is approximately bow-shaped when viewed from above.

As shown in Fig. 4A, the shape in front view resembles a coat hanger;

as shown in Fig. 4B, the shape in side view is approximately a flat plate-like shape with approximately right-angular bends at each end; as shown in Fig. 4C, the shape in top view is approximately bow-like, with approximately right-angular bends at each end.

As shown in Fig. 4A, a circular hole for slinging 21a is provided in a center section 21, and holes 21c for attaching the elastic shock-absorber 21b (see Figs. 1A to 1C) are formed on each side of the hole for slinging 21a.

As shown in Fig. 4B, the side sections 24 bend at a diagonal angle of ten degrees or so to the center section 21 when seen in plan view, and one pear-shaped hole 24a is formed in each side section 24 in order to reduce the overall weight. The side sections 24 bend downwards (as shown in Figs. 4A to 4C) and weight-reducing round holes 24b are provided in them.

The bent sections 22 at the ends of the sling fitting 20 have hinge sections 22a, which are nearly at right-angles to the side sections 24, and, as shown in Fig. 4B, a hinge hole 22b is provided near the bottom sides of each hinge section 22a

Embodiment 3

Fig. 5 shows a supporting structure for the sling fitting in a third embodiment of this invention, where the characteristic feature is the structure of the hinge section 22. The hinge section 22 comprises a joint 22i, which is connected by locking bolts 22h and fitted via a cylindrical member 22e' having a flange to a boss 11a that protrudes from the pipe frame 11. The cylindrical member 22e' should be comprised of a material such as Duracon.